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Proposals for Land Consolidation and Expansion in Japan

JIAN-MING ZHOU

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JIAN-MING ZHOU

BADIA FIESOLANA, SAN DOMENICO (FI)

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European University Institute
Badia Fiesolana
I – 50016 San Domenico (FI)
Italy

Abstract

Fragmented small farms in Japan and other high wage rice-based economies in monsoon Asia have become an obstacle to sustainable rural development. This problem has not yet been resolved under private land ownership. This article recommends that based on a mixed economy of private ownership of farmland and public ownership of infrastructure land, dispersed parcels of farms could be consolidated through exchange of private ownership and location into compact land units, which could then be enlarged by individual lease or cooperative/enterprise production; land could also be turned to public ownership to be contracted to expert farmers and cooperatives/enterprises - both would achieve economies of scale of land. In either process, intervention of governments, education of public opinion, active participation of farmers, and combination with overall rural development are necessary, and application of satellite remote sensing and computer technologies is helpful.[1]

Key Words: Monsoon Asia Rice Economy, Fragmented Small Farms, Land Consolidation, Large-Scale Farming, Mixed Economy, Private and Public Land Ownership, Dual-Land System.

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Fax: 0039-55-4685298 or 599887 - E-mail: Zhou@datacomm.iue.it

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In general, the Asian monsoon climate causes rains in May-October and dryness in November-April. Only rice suits this climate. It has been the major crop for about 40 centuries.[1] Up to the end of World War Two (WWII), a feudal landlord ownership had been dominant and most peasants owned little or no land and were either tenants or wage laborers, although there were also owner-peasants. Farm work had to be done by hand, with simple tools. Reclamation of new land had reached its limit. In the rainy half year, rice cultivation required highly labor-intensive, sophisticated and coordinated work, resulting in labor shortage. This demanded more labor and caused high population growth, low per capita cultivated land and small size and fragmentation of individual (family) farming units.[2] In contrast, during the dry half year, due to insufficient work opportunities, there were serious unemployment, underemployment or disguised unemployment.[3] Poverty was widespread and persistent. These rice-based economies were dual economies, predominantly agrarian with some industries in big cities.[4]

With the same natural conditions, such an economic situation was changed after WWII first in Japan, then also in Taiwan and South Korea. The Japanese model of rural development started in 1946. It combines nine major features or

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[1] Monsoon Asia contains 19 rice-based economies: China (mainland), Japan, North Korea, South Korea and Taiwan Province of China (hereafter Taiwan) in East Asia; Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), the Philippines, Thailand and Vietnam in Southeast Asia; and Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka in South Asia.

[2] "Farm" (or farming unit) means "agricultural holding", which refers to all land that is used wholly or partly for agricultural production and *is operated by one person* - the holder - alone or with the assistance of others, without regard to title, size or location (FAO-PY 1972: 408).

Fragmentation of an agricultural holding is generally defined as the state of division of the holding into *many* discrete parcels in a village (Fre-Gov 1950: 56. Binns 1950: 5). But some just define it as the situation in which a household operates *more than one* separate parcel of land (Blarel; Hazell; Place & Quiggin 1992: 233. Vander Meer 1982: 1).

A parcel is defined as all land in the holding entirely surrounded by land or water of other holdings or by land or water not forming part of any holding (FAO 1981: 92). It may also be called "noncontiguous piece of land", "plot" or "land unit".

Fragmentation is measured by the number of parcels of land in the holding in one village (the case of families holding land in several villages is excluded) (Heston & Kumar 1983: 199).

[3] Those who are willing and able to work but cannot find work are *unemployed.* Among those employed, those who are working less than full time and want more hours of work are *underemployed.* (Oshima 1993: 103). The part of the population engaged in agriculture who could be removed without reducing agricultural output, even though the technical methods in use remain unchanged, are *disguisedly unemployed* (Nurkse 1953: 32).

[4] Although Japan was developed, its industrialization was based on its import of foods from and export of industrial goods to colonies. Its agriculture was relatively stagnant. (Oshima 1987: 39, 109)

stages (drawn mainly from Oshima 1987: 60-65 as well as others indicated below).

1. ***Institutional changes for an individual-cooperative mixed economy***:

(1) The land reform during 1946-50 (Hayami & Yamada 1991: 83) compulsorily purchased the land of resident landlords over 1 ha and land of absentee landlords, sold land to peasants for individual ownership, protected tenants from eviction (Rothacher 1989: 16-17), set land rent at a very low level and imposed a 3 ha ceiling on land holding (Hayami 1988: 45, 80)[5]. This gave huge incentives for peasants to increase output, but also maintained numerous fragmented small farms. On average, the farm size was 0.8-1 ha, number of parcels per farm 10-20, and parcel size 0.06 ha, the total one way distance to parcels about 4 km (Hyodo 1956: 558) - also see Table below.

(2) The setting-up of national rural cooperatives provided forward and backward services and financing to the individual farming units. These were mainly service cooperatives. The direct production process of agriculture was under the independent control of the individual farming units. (Kojima 1988: 725)

2. ***Government policies supporting rice production and rural development*** included rice self-sufficiency, rice price support, farm credit and subsidies, technological research and extension services, rice import protection during 1961-93, and policies supporting features 1 above and 3-8 below.

Besides institutional changes, technological progress also contributed to economic growth, which was embodied in features 3-8. Five steps (3-7 below) were taken for reaching full employment:

3. ***Construction of rural infrastructure*** - mainly irrigation, land improvement, transportation, communication, electrification, education - established the technical basis for further rural development.

4. ***Higher yields and multiple cropping of rice and other grains*** (much of this was made possible by high-yielding varieties and fertilizers) raised both land and labor productivity and released labor from grain culture.

5. ***Diversified cropping[6] and non-crop agriculture***[7] raised peasants' income, changed agricultural structures, and promoted rural enterprises for

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[5] The farm size and fragmentation data in this paper exclude those of Hokkaido which is outside the monsoon region and has much larger farm size and fewer fragmented parcels.

[6] Diversified cropping implies a shift from a monoculture or a few crops (mainly grains) to a larger assortment of crops (roots and tubers, pulses, oil crops, vegetables, fruits, berries, treenuts, etc.) (Oshima 1993: 125. FAO-YP 1993: iv).

[7] Agriculture - depending on the context - in a broad sense includes cropping (farming), animal husbandry, fishery, forestry and hunting (Oshima 1993: 152) (the importance of hunting has been declining due to environmental protection); but in a narrow sense may only refer to cropping (farming).

processing, transporting and marketing products of crops, livestock, fishery and forestry.

6. ***Off-farm employment***[8] offered peasants jobs in both urban and rural enterprises, further increased peasants' income, changed rural structures, and promoted urbanization.

7. ***Peasant migration to cities and towns*** was mainly by able-bodied males, leaving the aged and women in agriculture.

As peasants could get jobs also in the dry half year, full employment was achieved and wages rose. Hence a post-full employment step:

8. ***Agricultural mechanization with small machinery*** sharply reduced the agricultural labor force without affecting output.

The first transition (from agriculture to industry) was hence completed, shortage of labor appeared, and the second transition (industry to services) started[9] in Japan around 1960 (FAO-PY 1972: 21). Rice self-sufficiency was reached in 1961, per capita product raised, equity in income distribution reached and poverty eradicated (Oshima 1987: 115. Oshima 1993: 112, 125). These eight features continued to function beyond 1960. Except for rice import protection in 2 above, they are significant for other economies. At this high stage of rural development, all the major obstacles imposed by the monsoon have been overcome except for:

9. ***The fragmented small farms*** (Kristof 1996: 4). In Japan, as people became richer, rice consumption declined, but was still necessary. In the high wage economy, the income from rice production turned out to be much lower than that from diversified cropping, non-crop agriculture and off-farm employment. If rice farmers could not be viable[10], they would have to abandon rice production so that rice self-sufficiency could not be kept. In order to make them viable, the income from rice production should be raised through ***removing***

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[8] Off-farm employment of farm families denotes their employment in nonagricultural sectors, i.e., industry and services. Industry contains mining, manufacturing, construction, public utilities, transportation and communication. Services comprise banking, real estate, business, public services which require the highest level of education and retail trade, restaurants, domestic and other personal services which only need minimal education. (Oshima 1993: 138, 152)

[9] In monsoon Asia, the first transition is said to be completed when the share of the agricultural labor force in the total labor force (about three fourths) has fallen, while the share of the industrial labor force has risen, to roughly one fourth - one third. The second transition is said to be concluded when the service sector overtakes the industrial sector in size of labor force. But there are elements of arbitrariness in the definitions and some exceptions may be possible. (Oshima 1987: 56, 58)

[10] Farms that earn income per farm household member equal to, or above, that of non-farm employees who are living in rural areas are "viable units" (Hayami 1988: 77).

fragmentation and enlarging farm size[11] so that large machinery could be used, labor saved, cost reduced and increasing returns to scale gained, as evidence later has shown [Nishimura & Sasaki 1993: 77. JMAFF (c). Hayami 1988: 98. JMAFF 1994].

Therefore, from 1961 on, as the first major effort toward large-scale farming, farmers' *purchase of land* was subsidized by the government. In 1962, the land holding ceiling was relaxed. However, not enough land sale occurred. On the supply side, part-time farming became dominant. Many able-bodied males commuted to off-farm employment, while their wives and old parents farmed. Absenteeism also occurred. But the part-time farmers and absentees had no incentive to sell land: off-farm income was high, the distance between towns and villages short, transportation convenient, they had no need to pay high rent for city dwellings, enjoyed less pollution, and preserved a rural house for their retirement. Moreover, as industrialization proceeded, land prices soared. Land sales in the future would be more profitable than now. On the demand side, because land prices went well over income surplus from rice production, it became unprofitable for full-time farmers to enlarge farm size through land purchase. (Hayami 1988: 80-86). In effect, it was the shortcomings of private land ownership that have hampered land sales.

Hence the resort to *land lease* as the second major effort toward large-scale farming. In 1970, rent control was removed, and land could be returned to landlords upon termination of contracts of more than 10 years. In 1975 and 1980, leases for shorter period were also legalized. However, although land lease occurred more than sale and formed some large-scale farms[12], the progress was limited. On the supply side, land owners were rich enough from off-farm income and did not have much incentive to rent out land. There was a strong egalitarianism among village people, who felt uncomfortable if a specific villager expanded his farm and became competitive in the market. This resulted in entrenched inefficiency and vested interests. (Hayami 1988: 86-88, 126). Farm households had a solid preference for permanent residence which has continued for generations, and regarded agricultural land as a valuable asset handed down from the ancestors which should be passed on as it is to the

[11] "Farm size" may refer to the acreage of land, or number of households, of the farm. The large farm size advocated in this paper for monsoon Asian rice-based economies denotes the *large size in land acreage of farm* whose basic operation unit is one household which may receive help from governments, collectives and cooperatives and hire non-family laborers; and collective/cooperative/enterprise farm as agricultural enterprise which may include a number of households as share-holders and/or employees.

[12] For example, in Saitama Prefecture, some large scale rice-wheat farms were formed by owned and leased lands with the acreage from 3 ha to 27 ha and on average 10 ha, but operated by senior farmers often without young successors (Kurita 1994: 511, 519).

offspring. They still feared that once let, land would be lost, as happened in the land reform. Thus, people had a tendency to avoid renting out land. On the demand side, because the small farm was composed of many fragmented parcels located in different parts of the village, it was not always possible for the lessee to join them into large land units (since the parcels of other land owners could be among them) or change their shape into roads, canals, ponds, etc. (since the ownership belonged to the lessor) for using large machinery. (Tabata 1990: 18, 22). Here, private land ownership constrained both land lease and the efficient use of leased land.

Since the 1970s, the third major effort to achieve large-scale farming was *commissioned agricultural work* (also called custom work) - commissioning or contracting a part or the whole process of rice cultivation primarily by small households holding land up to 0.5 ha to other farmers for using the latter's machinery, labor and management. The fourth major effort was *agricultural production cooperatives* - groups of farm households mainly holding land of 2-5 ha and over, accomplishing all or a part of agricultural production process by jointly using machinery and assigning members to commissioned work. Some production cooperatives were joined by farm households of a whole village, exercised collective use and management of private farmland and machinery, eliminated boundaries among parcels, thus enlarged farming scale (NIRA 1995: 173-174, 176-177). The fifth major effort was *enterprise farming* - enterprises other than farm households organized joint management, joint venture, production corporation and limited companies in farming including receiving commissioned work. These three forms all had advantages in tilling otherwise idle land, achieving economies of scale in using machinery, labor and management, and reducing cost of machinery. (Tabata 1990: 20-22). But except for the case of collective use of private land, they were less successful in achieving economies of scale of land. Without the agreement of all land owners concerned, they were unable to change land shape and form large land units. Fragmentation was still a barrier. Even in the case of collective use of private land, cooperative members could agree to remove boundaries among parcels, but disagree to turn their parcels into roads, canals, ponds, etc. Moreover, they held the right to quit the cooperative. In so doing, the joined land would be re-split.

The following Table shows that not much success in economies of scale of land has been achieved. Fragmentation was preserved even in those farms enlarged to over 5 ha. Much land still remained with part-time farmers and absentees in inefficient use. In 1994, of all farm households, full-time households accounted for only 16.1 %, while part-time 1 (mainly farming) took 13.9 %, and part-time 2 (mainly on other jobs) 70 % (JSY 1996: 224).

As a result, the number of viable farms diminished, and farmers and cooperatives organized political lobbying for ***protection***. The ruling party had

to yield, fearing loss of votes. [JMAFF (a). JMAFF (b). Hayami 1988: 27, 49, 51, 81. JSY 1996: 223. JMAFF 1995: 177]. In 1960, a "cost-of-production and income-compensation scheme" was designed. The government as the monopsonist buyer (through the national cooperatives) bought rice at a predetermined price and sold it at a lower price, thus subsidizing rice farmers. The 1961 Agricultural Basic Law prohibited rice imports. Rice prices increased to 10 times the world level in the 1980s. Stimulated by the price distortion, rice was overproduced until 1992. (Schaede; Asada & Tokunaga 1994: 388. Schaede; Lowe & Tokunaga 1996: 422)

Japanese Farm Size (ha) 1950-94 and Fragmentation 1988

Year	Under 0.5	0.5-1	1-2	2-3	3-5	Over 5	Total	Average farm size
1950	41.0	32.0	21.7	3.4	1.2	0.8	100 %	1.0
1960	38.3	31.7	23.6	3.8	1.5	1.0	100 %	1.0
1970	38.0	30.2	24.1	4.8	1.7	1.3	100 %	1.1
1980	41.6	28.1	21.2	5.3	2.2	1.5	100 %	1.2
1985	42.7	27.1	20.4	5.5	2.5	1.7	100 %	1.2
1990	41.7	28.1	20.9	9.3			100 %	1.1
1994	21.7	37.2	27.9	13.3			100 %	1.4

Parcels per farm over 5 ha

1988	1-4	5-8	9 and more
100 %	28.4	39.1	32.5

Sources: For 1950-85: Kayo 1977; JMAFF (a); JMAFF (d); Hayami 1988: 27. For 1990 and 1994: JSY 1992: 161; JSY 1996: 223, 229. For 1988: JMAFF 1988: 250.

Consequently, in the 1980s, the budget deficit on rice rose to more than US$ 7,000 million. Internationally, protests flowed, especially from the US. The GATT Uruguay Round of 1993 stipulated a "phase-in" of rice imports of 10 % of the total market until 2005. When Japan experienced a disastrous harvest in 1993, rice had to be imported for the first time after 1960, in 1994, from Australia, China, Thailand and the US. (Schaede; Lowe & Tokunaga 1996: 422-423. ESJ 1960-61: 70). Rice self-sufficiency was thus over. In 1996, two thirds of what the Japanese eat is imported cheaper food. Further liberalization is

expected. (Kristof 1996: 4). However, with fragmented small farms, it is difficult for rice farmers to survive and for the government to restore rice self-sufficiency. Subsidies have to continue. A grant of 6,000 billion yen was included in the 1995/96 budget for farmers to adjust to the new regime (Schaede; Lowe & Tokunaga 1996: 423). Thus, the critical issue is how to consolidate and enlarge the fragmented small farms.

The fragmented small farms were efficient in a low wage economy since they were conducive to development and diffusion of land-saving and scale-neutral technology, dispersion of natural risks, and provision of employment to peasants without off-farm job opportunities. But in a high wage economy, they hamper the achievement of economies of scale of land, and waste resources of land, labor, capital, management, and technology. This problem is common to all rapidly industrializing economies with limited land resources and reduced working population in agriculture (although their degrees of fragmentation may vary). Of other rice-based economies under private land ownership in monsoon Asia, Taiwan and South Korea replicated the Japanese model. (Hayami & Yamada 1991: 7). Indonesia, Malaysia, Thailand, the Philippines; Bangladesh, India, Pakistan, Sri Lanka; Bhutan and Nepal are generally at lower stages of the model. Once their industrialization has led them into the high wage economy, this fragmented small farm structure would also prove to be inefficient.

Therefore, the fragmented small farms have become the ***remaining*** or ***last*** obstacle to sustainable agricultural and rural development in monsoon Asia.[13] Although substantial analysis of this problem has been made by many leading economists in this field for many years, fundamental solutions have not yet been found (e.g., Bray 1986. Oshima 1987. Hayami 1988. Rothacher 1989. Hayami & Yamada 1991. Oshima 1993. Francks 1995. NIRA 1995) (Taiwan and India have consolidated farmland to a certain extent, but fragmentation still exists and farms are still small in general).

This paper presents two proposals to consolidate and enlarge the fragmented small farms in Japan. The recommendations are drawn mainly in terms of the historical experience of Japan, but also those of other countries and regions (lengthy details, however, are not dealt with).

Proposal 1. Consolidation and expansion of the fragmented small farms based on a mixed economy of private ownership of farmland and public

[13] In 1991, FAO/Netherlands Conference on Agriculture and the Environment defined the essential and interdependent goals of sustainable agricultural and rural development as "Food security, to be obtained by ensuring an appropriate and sustainable balance between self-sufficiency and self-reliance; employment and income generation in rural areas, particularly to eradicate poverty; and natural resource conservation and environmental protection." (SDD-FAO 1995: 1)

ownership of infrastructure land.

The first step, consolidation of the fragmented farms.

Definition of land consolidation under private land ownership. Land consolidation is an exchange of the private ownership and location of spatially dispersed parcels of farms to form new holdings containing just one (or as few as possible) parcel(s), with the same (or similar) wealth in land as that before the exchange. No land owner would be a loser after the consolidation. (Oldenburg 1990: 183). It is, however, not a measure for social justice. It neither changes the status of the large and small land owners, nor gives farmland to the landless. (Trivedi & Trivedi 1973: 180). Therefore, it could be implemented with no or incomplete land reform [e.g., in India since 1900 (Zaheer 1975: 92-95, 118)[14]], or together with the land reform [e.g., in Denmark during 1770s-1835 and Ireland during 1870-1940s, which distributed land of landlords to peasants with equity in consolidated forms (Skovgaard 1950: 43, 45. Ire-Gov 1950: 64-76)], or after the land reform [e.g., in Switzerland during 1840-1940s and Taiwan since 1959, which preserved equity in land ownership (Swi-Gov 1950: 82, 85. Huang, Chieh 1967: Foreword. Myers 1996: 260)].

General procedure of land consolidation. There has been little difference between developing and developed countries as far as collective action for consolidation is concerned (Sharma 1986: 716). Programs of land consolidation differ in various respects: from voluntary to compulsory, from dealing only with farmland to being linked to overall rural development, from farmers alone bearing the cost to sharing it with the authorities (Oldenburg 1990: 183), and from using primitive methods to advanced satellite remote sensing and computer technologies. Here is the general procedure.

Administrative preparations. Government guidance committees at national and local (province, prefecture, county, municipality, district) should be set up; education of public opinion about the disadvantages of fragmentation and advantages of land consolidation made; laws, statutes and regulations concerning the major aspects of the land consolidation established; and special tribunals at primary and appellate courts formed. Especially, it should be decided whether land consolidation should be started upon the consent of landowners by 100 % (voluntary), or 0 % (compulsory), or between these two extremes (partly voluntary or partly compulsory).

Once a village has decided to carry out land consolidation, it should set

[14] Even in the 1980s, in some areas of India, poor farmers with small parcels of low-value land might only be able to trade them in for an even smaller but better land unit which merely allowed them to grow some vegetables (Oldenburg 1990: 189). The lack of a complete land reform for equity in land ownership may be one reason why rural poverty is still widespread in this country.

up an executive committee consisting of representatives of officials, large and small land owners and tenants, and under which a technicians group composed of experts on survey, appraisal, land records, computer, rural infrastructure and development as well as some officials. An expected time limit for completing the consolidation should be announced.[15] Landholders (owners and tenants) would thereafter be prohibited from taking any action which might lower the value of their land property without the permission of the village executive committee. Infringers of this rule are liable to a fine. (Vanderpol 1956: 552). New construction in the fields and transfer of lands would not be allowed (Elder 1962: 23).

Technical preparations. The technicians group should correct the current farmland cadastral records, and produce a provisional consolidation scheme with maps of assessing the value of the current land holdings, setting aside land for the communal use, and assigning new holdings to each household (Bonner 1987: 21). It should then send the scheme with the maps to the village executive committee which in turn should inform all households of this for discussion. In case of disagreement, households could appeal for re-arrangement to the village executive committee, the guidance committees of the local governments, the primary court and appellate court whose judgement should be final. (Trivedi & Trivedi 1973: 183. Oldenburg 1990: 185)

Implementation. Once the appeals have been handled, the consolidation scheme could be fixed. After the main (autumn) harvest, it could be implemented. The new land cadastral records should then be established by notary public. The consolidation is thus completed. (Bonner 1987: 22. Vanderpol 1956: 553)

Some major issues in the above general procedure are discussed below.

Education of public opinion. The "public" includes both peasants and policy-makers. In Japan, land consolidation was already sporadically carried out in the ancient times. In 1901, the law on cultivated land consolidation was established to enable owners of agricultural land to organize cooperatives for the consolidation of their lands. But the feudal landlords hampered the progress. The postwar government decided to postpone land consolidation until the land reform had been completed. Thus, in June 1949, the Land Improvement Law was introduced but not actually realized. There were both technological and economic causes such as incomplete rural infrastructure, especially irrigation, the need to spread risks of natural disasters over dispersed parcels, rice monoculture by overpopulated farming communities, etc. There also were psychological

[15] For example, it took two-three years in France and three-four years in the Netherlands in the 1940s-50s, and six-nine months in some areas of India in the 1980s (Roche 1956: 543. Van Rossem 1956: 555. Oldenburg 1990: 186, 193).

reasons not least that peasants did not want to leave parcels inherited from their ancestors. (Hyodo 1956: 558-559). Although the technological and economic problems had generally been overcome by the end of the 1950s, land consolidation has not been promoted since. This reflects not only the prevalence of the psychological factors, but also the lack of firm commitment of the government which has failed to attach enough importance to it. For example, in "The Basic Direction of New Policies for Food, Agriculture and Rural Areas" of Nov. 1992, the Japanese Ministry of Agriculture, Forestry and Fisheries (JMAFF) only devoted a few words, in a total of 34 pages, to this issue (even without using the term "land consolidation"): "To foster farm management bodies that will operate on large-scale, aggregated farmland, methods to promote land improvement projects will be implemented that *allow land to be exchanged*" (JMAFF 1992: 15). Thereafter, however, little land consolidation has taken place. Thus, it is necessary for the government to make it a major effort. Education of peasants on the disadvantages of fragmentation and advantages of land consolidation should also be strengthened so as to mobilize them to actively participate.

Consent of peasants. The process of exchange of private parcels for consolidation would not be easy. There are indefinite individual obstacles to land consolidation. The resulting farms differ considerably in size, type, and topography. Some farmers get better bargains than others - and probably a still larger number will fear that others may do so. Some households may receive poorer land than they had before. It may not be possible to accommodate all the farmers. This would be compounded by the inertia of peasant tradition. For example, one family could claim that its parcels are heritage of its ancestors and could not be given away. Another may feel unfamiliar with the new parcels. There also will be financial concerns. For instance, some farmers may worry that permanent crops, buildings, etc., in the old parcels would not be sufficiently compensated. (Binns 1950: 22-23). Such realities imply that - to fulfil its objectives - consolidation may be voluntary, compulsory or partly voluntary.

- *Voluntary consolidation* is one when 100 % of landowners of the village (or area concerned) agree to carry it out. It could be spontaneous efforts of farmers in the form of cooperatives or personal exchanges, and should be assisted and encouraged by governments. However, for the above reasons, such operations are slow and unsatisfactory. Anything like complete success is unlikely to result from purely private enterprise. (Binns 1950: 24-25. Zaheer 1975: 92-93. Clout 1984: 104)

For example, consolidation was practiced in the village fields of Oster Hjermitslev, Denmark, in 1820 by the freehold farmers (owner-peasants) themselves. Having been unable to agree on a rational consolidation scheme, the farmers' land remained split up in 12 different places all over the village. In

1917, nearly 100 years after, though some amalgamation of the parcels of land had taken place, the situation remained unchanged. Experience in Denmark has been that where the consolidation process has been under the peasants alone, it has been badly carried out. (Skovgaard 1950: 45-46, 50-51). Slow progress under voluntary consolidation was also evident in France (1697-1888), Switzerland (1884-1911), India (1900-1951), and the Netherlands (before 1920) (Roche 1956: 539. Swi-Gov 1950: 83. Zaheer 1975: 92-93. Clout 1984: 104. Vanderpol 1956: 549). Therefore, government intervention was called for.

- *Compulsory consolidation*, as another extreme, is one imposed by the authorities even if 0 % of landowners of the village (or area concerned) wishes to start it. The authorities normally listen to landowners - but not through mass voting - before making decision, and landowners could also appeal but have to accept the decision of the higher authorities. This approach may result in uncooperation, resentment and resistance of peasants. It might succeed in relatively less democratic times or areas relatively easier for consolidation [e.g., there were positive cases in Denmark during 1770s-1835 and France during 1935-80s (Skovgaard 1950: 43-45. Fre-Gov 1950: 59-60. Roche 1956: 539-543. Clout 1984: 105-110)], but not succeed much, or even fail, in an increasingly democratic era or regions comparably more difficult for consolidation. For example, in the 1950s, in the village of Manovan, Uttar Pradesh of India, opposition to compulsory consolidation took a political turn when the Jan Sangh Party led a campaign to obstruct consolidation and evicted farmers who took the newly assigned parcels. Police had to arrest seven local leaders before consolidation could proceed. (Elder 1962: 27). In France, such schemes have been criticized as being over costly, bureaucratic and paying too much attention to the interests of land owners, especially in areas where tenancy was important. Fragmentation was still a severe problem in the 1980s, particularly in vine and fruit growing regions. (Harrison 1982: 41-42). In 1996, small farmers in Slovenia resisted the government's decision to proceed with compulsory consolidation (Riddell 1996). Therefore, democracy and sufficient participation by peasants in deciding whether to carry out consolidation are important.

- *Partly voluntary consolidation* is one started with the consent of some landowners of the village (or area concerned) and approval of the authorities, while others, although disagreeing, have to follow. Accord by substantial majority (two thirds of land owners representing two thirds of land) is similar to a voluntary scheme and therefore is difficult to obtain. Consent by simple minority (one third of land owners representing one third of land, or even less) is close to compulsory action and thus could not always achieve the cooperation of other farmers in a democratic era. Agreement by simple majority (51 %) or half would be more effective. Therefore, on one hand, the Netherlands transformed the requirement for agreement ratio from 100 % to 66.7 % in 1920,

further to 51 % in 1938 (Vanderpol 1956: 549); on the other, Sweden changed from requiring the agreement of only one land owner in a village in 1757 to that of majority in 1926 (Ytterborn 1956: 560). Taiwan and Portugal adopted 51 % in 1936 and 1962 [Huang, Chieh 1967: (Appendix) 1, 37-38. Monke; Avillez & Ferro 1992: 69], while Greece and Japan stipulated 50 % in 1948 and 1949 respectively (Keeler & Skuras 1990: 74. Hyodo 1956: 559) [in India, rules vary among states from compulsory, simple minority, to substantial majority (Agarwal 1971: Appendix II)]. In general, once 51 % of landowners representing 51 % of land in the area concerned have agreed, land consolidation could be started.

Here, governmental intervention toward consolidation has aimed at encouraging voluntary action and supporting it by financial and other inducements, and technical assistance. Such activities need to educate public opinion, with very careful and intensive preparation. Nevertheless, *legal power for compulsory action should be reserved in special cases.* (Binns 1950: 25). For example, the Netherlands empowered the Ministry of Agriculture in 1938 to impose consolidation schemes when they were urgently demanded by the public interest even if the necessary votes had not been obtained; and Greece prescribed in 1948 that consolidation could be compulsory if it was needed to successfully complete drainage and irrigation projects - both of them have facilitated land consolidation (Vanderpol 1956: 550, 552. Keeler & Skuras 1990: 74-75).

However, the above-mentioned "The Basic Direction of New Policies for Food, Agriculture and Rural Areas" of Nov. 1992 by JMAFF declared that "In the implementation of improvement projects for farmland, the *consensus* of the farmers concerned *must* be obtained." (JMAFF 1992: 15). This has doubled the 50 % requirement by the Japanese law of 1949 to 100 % which is infeasible. Agreement by 51 % of land owners plus government compulsory action in special cases would be more effective.

Assessment of the value of current farmland holdings. The most critical phase of the entire process is the evaluation of the farmlands. Only an impartial and accurate valuation can assure a fair and equitable redistribution. Three major methods for valuing land could be considered. These are valuation by (1) market price; (2) rental value; and (3) land productivity. The main disadvantage of the first method is that the market price of some parcels (e.g., those near the village site) may be very high as reflecting industrial or housing demand for land rather than agricultural profits. The major disadvantage of the second is that rental system varies from fixed rent to proportionate rent in cash or kind, which renders the determination of exact rental value difficult. Therefore, the third method is more suitable. Under this system, the value of a parcel of land is based on an assessment of its agricultural productivity. A variety of natural

factors should be considered, including the acreage, fertility, access to water, flatness and distance to the village site, etc. After touring the village lands, the technicians group select some parcels which are, by common agreement, the best in the village in terms of one or some of these factors, thus becoming the standard of others. (Bonner 1987: 22. Roche 1956: 541). Below is an illustration [The principle in the following method has been used in practice (e.g., in India - Oldenburg 1990: 186). But the mathematical generalization is made by the author as unfound in the literature reviewed. It could be adapted to local conditions and expanded to more complicated models using econometric tools and computer techniques. The numbers are hypothetical. The sizes of farms in figures are not proportionate to the grades].

Suppose: A village has *m* (say, five) household farms - F_m: m = 1, 2, ..., 5;

Each farm has up to *n* (say, 10) parcels located in different places - P_n: n = 1, 2, ... , 10; also suppose F_1 has 6 parcels, F_2 7 parcels, ..., F_5 10 parcels; (see Figure 2)

Each parcel can be assessed on *i* factors (say, five: acreage, fertility, access to water, flatness, distance to village site) - Q_i: i = 1, 2, ..., 5; the best parcel in one factor could be assessed as 1 (e.g., in Figure 1, P_1 is valued as 1 in Q_2 - fertility, and P_4 is given 1 in Q_5 - distance to village site), parcels inferior to it could be given numbers smaller than 1.

Each factor could be given different weight - W_j: = (0, 1), j = 1, 2, ..., 5; Total W = 1 (acreage and fertility may receive higher weights, and in general a smaller area of good land could be exchanged with a larger area of poor land; in Figure 1, these five factors are given weights of 0.35, 0.35, 0.15, 0.05, 0.1 respectively) (See formulas and illustration in Figure 1).

Following the assessment, grade could be given to each farm, say, F_1 = 2.48, F_2 = 3.26, F_3 = 4.37, F_4 = 5.93, F_5 = 6.12.

The fixed capital assets (permanent crops, orchards, vineyards, buildings, wells, etc.) on the parcels are not natural but artificial factors. Those which have to be destroyed should be reimbursed or rebuilt in the new place by the village; those which will be reserved but transferred to another owner should be paid by that owner (offsetting between owners may be arranged), or be valued as extra grade to the parcels.

Promotion of rural development. Among the newly established larger land units, major infrastructure items (main roads among farms and linked to other villages, water conservancy, irrigation and drainage network linking lakes-rivers-canals-ditches-drains, electricity facilities, etc.) should be built, so that each land unit could have easy access to roads, large machinery, irrigation and other facilities. A scientific design for the facilities of processing and storing agricultural products, schools, hospitals, cultural halls, sport grounds, post and

telecommunications office, village administrative offices, housing, land for industrial use, land reserved for future construction, etc., in the village site should be made. Environmental protection (forest, nature reserves, tourist resorts, etc.) should be taken into consideration.

Thus, a number of villages in a district could coordinate their consolidation plans or even create a general one. Migration of some peasants from the congested to less crowded rural districts could be arranged, so that both the remaining and outgoing peasants could acquire larger land units. Apparently, government coordination is necessary.

Each farm should contribute a small percentage (e.g., 3 % - 5 %) of farmland for the communal use. The removal of numerous boundaries would make this possible without (significant) reduction of farm size. (Zaheer 1975: 113). Nominal compensation could be paid to the contributors by the village (Trivedi & Trivedi 1973: 183-184). Exchanges between farmland and non-farmland, and between private and public land could also be organized.

$$\begin{aligned} \text{Grade for } F_1 &= P_1(Q_1W_1 + Q_2W_2 + \ldots + Q_5W_5) \\ &+ P_2(Q_1W_1 + Q_2W_2 + \ldots + Q_5W_5) \\ &+ \ldots \\ &+ P_6(Q_1W_1 + Q_2W_2 + \ldots + Q_5W_5) \\ &= \sum_{n=1}^{6} P_n \sum_{i,j=1}^{5} Q_iW_j = 2.48, \; W_j = (0,1) \; , \sum_{j=1}^{5} W_j = 1 \end{aligned}$$

$$\text{Grade for } F_2 = \sum_{n=1}^{7} P_n \sum_{i,j=1}^{5} Q_iW_j = 3.26$$

$$\text{Grade for } F_3 = \sum_{n=1}^{8} P_n \sum_{i,j=1}^{5} Q_iW_j = 4.37$$

$$\text{Grade for } F_4 = \sum_{n=1}^{9} P_n \sum_{i,j=1}^{5} Q_iW_j = 5.93$$

$$\text{Grade for } F_5 = \sum_{n=1}^{10} P_n \sum_{i,j=1}^{5} Q_iW_j = 6.12$$

Figure 1 Illustration of Assessing Grade for Farm 1

	Q_1	W_1	Q_1W_1	Q_2	W_2	Q_2W_2	Q_3	W_3	Q_3W_3	Q_4	W_4	Q_4W_4	Q_5	W_5	Q_5W_5	Sub-grade
P_1	.05	.35	.0175	1	.35	.35	.9	.15	.135	.8	.05	.04	.5	.1	.05	0.5925
P_2	.1		.035	.8		.28	.3		.045	.9		.045	.3		.03	0.435
P_3	.15		.0525	.6		.21	.7		.105	.7		.035	.7		.07	0.4725
P_4	.2		.07	.4		.14	.5		.075	.3		.015	1		.1	0.4
P_5	.2		.07	.3		.105	.4		.06	.4		.02	.6		.06	0.315
P_6	.3		.105	.2		.07	.3		.045	.7		.035	.1		.01	0.265
Q_1, W_1: acreage (ha); Q_2, W_2: fertility; Q_3, W_3: access to water; Q_4, W_4: flatness; Q_5, W_5: distance to village site Sub-grade = $Q_1W_1 + Q_2W_2 + Q_3W_3 + Q_4W_4 + Q_5W_5$																2.48 Total grade

Figure 2 Before Consolidation - Fragmented Farms							
F_1P_1	F_4P_1	F_3P_1	F_2P_1	F_5P_1	F_1P_2	F_2P_2	F_5P_2
F_2P_3	F_5P_3	F_2P_4	F_4P_2	F_3P_2	F_4P_3	F_5P_4	F_1P_3
F_3P_3	F_1P_4	F_4P_4	F_5P_5	F_4P_5	F_5P_6	F_2P_5	F_3P_4
F_4P_6	F_3P_5	F_5P_7	F_1P_5	F_2P_6	F_3P_6	F_4P_7	F_5P_8
F_5P_9	F_4P_8	F_3P_7	F_2P_7	F_3P_8	F_5P_{10}	F_1P_6	F_4P_9

Figure 3 After Consolidation - Each Farm Has *Two* Parcels				
F_1P_1	F_3P_1	F_5P_1	F_2P_2	F_4P_2
F_2P_1	F_4P_1	F_1P_2	F_3P_2	F_5P_2

Figure 4 After Consolidation - Each Farm Has *One* Parcel				
F_1	F_2	F_3	F_4	F_5

The land beneath the major infrastructure items should be publicly owned by governments (central, local) or village - hence a mixed economy of private ownership of farmland and public ownership of infrastructure land. The main reasons are that private land owners may inhibit others from getting access to these items (Oldenburg 1990: 188) and also have the right to withdraw their land if they wish, which would exert harmful externalities on other peasants and the whole community. The infrastructure items themselves could belong to the governments or village and individual investors according to their respective

investment shares. [There have been good experiences in combining land consolidation with the overall rural development in Belgium, France, Germany, Greece, India, the Netherlands, etc. (Clout 1984: 108-116. Zaheer 1975: 112-113. Keeler & Skuras 1990: 75)]

Assignment of new farmland to each household. The land assigned to each farm should be given the most practical shape possible (in general *rectangular* - the length of the parcel should not be more than three or four times its breadth, and *square* for larger parcels) (Skovgaard 1950: 44. Roche 1956: 541). After the reorganization, each household would privately own one or a few (preferably no more than three) compact farmland unit(s) (see Figures 3 and 4). The total farm size is more or less the same as before, but the size of land unit (parcel) is larger. For example, a farm previously composed of 10 dispersed parcels (on average 0.1 ha each) can now hold one compact parcel of 1 ha.

Some discreteness of parcels may be rational due to differences in geography, ecology, etc. For example, a farmer may need both summer and winter pasture in certain hill areas, or land suitable for seed nurseries and land for growing of rice, or varieties of soil and situation in certain types of mixed farming to avoid risk of being dependent on one product. There is also local custom of working both an upland parcel and a parcel on river banks and islands where work is done at entirely different seasons. (Binns 1950: 31. Heston & Kumar 1983: 213). Many farms in mountain regions consist of three separate estates - in the plains, in the middle levels and on the high levels. The solution may be to lighten the task and the expense of the peasants by regrouping to the greatest possible extent the lands which they possess at the various levels, and by reducing to a minimum the capital invested in construction. (Swi-Gov 1950: 90). In a village with very distinct qualities of land, exchanging a smaller area of good land with a larger area of poor land to form just one compact land unit for each farm might be difficult. Under such circumstances, different qualities could be classified into a few (e.g., three) classes, and a farmer could retain consolidated parcels of each quality, whose original fragments were in each class. (Heston & Kumar 1983: 209-210, 213). In general, most farms should contain only one parcel, with a few farms holding two or three (Oldenburg 1990: 186. Trivedi & Trivedi 1973: 186. Skovgaard 1950: 43-44).

Application of modern technologies. A cadastre, which registers not only the boundaries but also the quality and value of real estate, is basic to land redistribution. Previously, with hundreds of tiny parcels to delineate, it could take years, often decades, for surveyors to draw and redraw maps to come up with an equitable form of consolidation. Mistakes occurred[16], disputes

[16] In the land consolidation of some areas of India, irrigation experts had to rely on guesswork and conjecture, and consolidation officials made channels on paper which were

increased, farmers felt imposed on and were reluctant to cooperate. (Nelson 1993: 24)

Now, this work can be much simplified. The government could organize satellite remote sensing for national land cover mapping as a component within a Geographic Information System (GIS), providing land data to each village (Haack & English 1996: 845). An ordinary personal computer equipped with the right program can create a cadastre from aerial photographs and digitalized field notes gathered with high speed by an Electronic Distance Measuring system (EDM). Values of parcels resulting from assessment can also be put in. Using the computer, a surveyor can produce a cadastre in minutes and redraw it just as quickly in response to any number of "what if" scenarios. It can be done on the spot with the participation of the local farming community. People whose land boundaries are in question can consider the alternatives and explain exactly what they want and do not want at each step. Each household could see the new map including its own future farm in the computer screen and make appeals if necessary before the consolidation scheme is finalized. Once the final version is ready, the information is fed into a larger, more powerful micro-computer capable of drawing the fine lines needed for boundaries and producing a map on durable, high-quality paper. (Nelson 1993: 24). In this way, survey, valuation, calculation, design, allocation, expenditure, etc., could be much facilitated, mistakes reduced, disputes decreased, unfair distribution due to corruption of officials supervised and time shortened.

Control of corruption. Corruption could be a major problem in the consolidation. It is reported that in some areas of India, large land owners paid bribes to the consolidation officials and got land of better quality, near the village and with fewer parcels, while the small owners could not afford to bribe, thus received the opposite and became poorer (Elder 1962: 36). Factions in the villages are commonplace and can stimulate corruption. Except for using computer as mentioned above, thorough and intensive inspection, investigation of appeals on the spot before the whole village assembly and removal of the corrupt officials are necessary for combating this problem. (Trivedi & Trivedi 1973: 185)

Appeals should thus be handled, at maximumly three levels in administrative system (village executive committee, guidance committees of two levels of the local governments above the village), plus two levels in judicial system (primary and appellate courts). A time limit for processing is necessary, because once consolidation has been promulgated, farmers would not improve the original land but wait for the new one (Trivedi & Trivedi 1973: 185). Administrative processing of appeals should take no more than three months.

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later discovered to be unworkable when demarcated on the spot (Zaheer 1975: 117).

Courts would take a much longer time and cost much more money. Thus either special tribunals should be set up to speed the processing, or peasants be persuaded not to sue for small bargains (Oldenburg 1990: 185-186) and administrative processing be strengthened accordingly.

Expenses are incurred in the above process. For private landholders, some permanent crops, buildings and other infrastructure in the old parcels would have to be removed and compensated, new buildings and other infrastructure in the new farms be built and subsidized. Some peasants might be asked to migrate to other areas and be subsidized as well. Public infrastructure implies public finance. Fees for organizational purposes occurred for setting up ad hoc committees, inviting external experts, etc. These expenses should be borne by the central and local governments, village and landholders in the form of government grants and loans, bank credits, and personal payments. The village and landholders should be involved in decision making and allocation concerning the funds.

The second step, expansion of the consolidated farms for efficient use by full-time farmers.

Land consolidation only turns farms from fragmented to compact. It neither enlarges farm size nor ensures efficient use of the consolidated land. For example, land consolidation in Taiwan was strengthened in 1975 as "the second land reform". By 1982, 300,000 ha, or two thirds of 446,000 ha farmland planned for consolidation had been reorganized into large, rectangular fields more suitable for mechanized farming. By 1989, however, 88.6 % of farming households were still part-time farms, which earned 62.8 % of their income from off-farm activities. (Myers 1996: 260). In 1994, 4.4 ha were the rice farming area that enabled a full-time farm family to earn an income from its farming to balance off its consumptive expenditure. But those who held this or larger land scale only accounted for 7 % of all the farm families. (Cheng, Shy-Hwa 1994: 94-95). Therefore, after consolidation, special measures should be taken to make farms enlarged and used efficiently by full-time farmers. There could be two ways to achieve this end.

(1) *Individual lease.* Part-time farmers and absentees could lease their compact land units to full-time farmers so that the latter could operate larger land and use large machinery. Some shortcomings may remain. First, if the land units of lessor and lessee are noncontiguous but across some land units of other owners, it would be difficult to join them by re-exchange of private ownership and location of land units with their neighbors, due to the high transaction costs involved. Second, once the lease contract is over, the lessor may withdraw the land. Hence, keeping/raising economies of scale of land would be hampered. Third, young people may not want to succeed their old parents in farming.

(2) *Setting up production cooperatives/enterprises.* In such a

cooperative/enterprise, public land used for infrastructure and private farmland could become land shares (private land owners may choose not to till the land); members (even those outsiders who do not own any land in the cooperative/enterprise) could invest capital shares, while revenue could be distributed among land shares, capital shares and labor contribution. Members could then contribute to further investment in the cooperative/enterprise (e.g., buying more machines) as their new capital shares. During the consolidation of private farmland, the land units of those who wish to join the cooperative/enterprise could be put together, so that the land units of all land owners of the cooperative/enterprise could be joined to reach a level of economies of scale much larger than that under individual lease. Increasing capital shares could make the position of the cooperative/enterprise in equipment (especially large machinery), etc., much stronger than that of individual lease. Some well-trained managers could be hired to supervise the operation of full-time farmers/employees. Wage labor could be employed so as to overcome the problem of no successor as faced in individual farming. One remaining shortcoming may be that some private land owners may quit the cooperative/enterprise someday if they wish. As a result, the large joined land may be split again.

"The Basic Direction of New Policies for Food, Agriculture and Rural Areas" of Nov. 1992 by JMAFF proclaimed that "To foster farm management bodies that will operate on large-scale, aggregated farmland, methods to promote land improvement projects will be implemented that ... establish land-use rights in an integrated manner with the *full agreement of both owners and users* of the land." (JMAFF 1992: 15). Actually, however, just as it is difficult to get full agreement of land owners to carry out land consolidation, it is hard to obtain a consensus of both land owners and users for farm enlargement. Therefore, for promoting farm expansion, it is also necessary to educate the public opinion to reduce/remove the above-mentioned peasants' egalitarianism against fellow villagers to expand farms and their aversion to lease land. On those absentee landowners and part-time farmers who are unwilling to lease land or join cooperative/enterprise, tax could be imposed (Schiller 1956: 563).

Proposal 2. Establishment of a dual-land system based on public land ownership.

Rural land could be purchased for public ownership at appropriate prices (lower than the levels representing the industrial demand for land), while all the other means of production could be privately, publicly and jointly owned. Then a *dual-land system* under the management of villages and regulation of central and local governments could be set up. (1) *Land for living* could be distributed equally to rural residents for their use in agricultural production for self-consumption and housing. If one has formally migrated to urban sector,

proportionate farmland should be withdrawn from his (her) household. Considering the strong attachment to ancient land by Japanese peasants, the already assigned housing land upon which private houses have been built might possibly be reserved for retirement use and even inherited. But new housing land would reasonably not be assigned to the emigrant. (2) *Land for production* should be contracted in long term to expert farmers who bid for higher output of rice and other products so that large land units could be formed and large machinery used. Contract could be transferred and renewed according to market principles of competition. Within the contract period, if not due to natural disaster, output target is not reached, land quality destroyed, production abandoned, etc., the contract could be stopped and sanction made. If land improvement has been made, awards could be given. If some production becomes surplus, fields could be used for other (even non-agricultural) productive purposes. Production cooperatives/enterprises (as presented above but without private land shares) could also be set up, in which expert farmers could work together. Wage labor could be hired as well.

The result is a mixed economy of public land ownership, private/public ownership of other means of production, individual/cooperative/collective management and capitalist wage labor employment. The above-mentioned shortcomings in individual lease and production cooperative/enterprise with private land shares could be avoided. Needless to say, intervention of governments, education of public opinion, active participation of peasants, and combination with overall rural development are necessary. Details (the public ownership be at state, local government or village level; land-purchase procedure and prices; land-contract length and fee, etc.) should be determined through gradual experiments, public discussions, and expert consultations.

In the current global wave of privatization, this proposal might not be adopted immediately. But it may deserve consideration and experiments. In China, the economic reform against the centrally planned economy starting in 1978 created village-owned but household-managed fragmented small farms which brought huge incentives to peasants for production. However, as more and more rural regions successively moved into the high wage economy, this farming structure also hampered sustainable rural development. Thus, since the 1980s, the dual-land system has been practiced. It achieved large-scale farming and succeeded in overcoming this obstacle. In Japan, the collective use and management of private land by village production cooperative were a spontaneous effort by village officials and peasants to resolve the same obstacle. It could remove boundaries among parcels and reach large-scale farming, but households could refuse to change their parcels into roads, canals, ponds, etc., and could quit the cooperative, thus refragmentizing the joined land, as already mentioned. Turning private land to public ownership might be a natural further

development so as to overcome such shortcomings.

To what extent should a farm be enlarged? This is a practical question to which the answer depends on time and place. For example, in 1994, in Saitama Prefecture of Japan, the critical size for a viable rice farm has been established at 15 ha or more (Kurita 1994: 511), while in Taiwan a survival area for a full-time rice farm was 4.4 ha as mentioned above. As time passes, the economic structures (urban-rural, industry-agriculture, import-export, etc.), technologies, managing and tilling skills as well as the ratio of cost/profit in rice and other agricultural production change. Thus, farm size could be adjusted accordingly by joining compact farms for expansion or separating them for contraction.

These two proposals for Japan might also be useful for other rice-based economies in monsoon Asia under the private land ownership once the fragmented small farms have become an obstacle to sustainable rural development.

Conclusion. In order to overcome the fragmented small farms obstacle in Japan and other rice-based economies of monsoon Asia, this article proposes that based on a mixed economy of private ownership of farmland and public ownership of infrastructure land, dispersed parcels of farms could be consolidated through exchange of private ownership and location into compact land units, which could then be enlarged by individual lease or cooperative/enterprise production; land could also be turned to public ownership to be contracted to expert farmers and cooperatives/enterprises - both would achieve economies of scale of land. In either process, intervention of governments, education of public opinion, active participation of farmers, and combination with overall rural development are necessary, and application of satellite remote sensing and computer technologies is beneficial.

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